FIG. 1

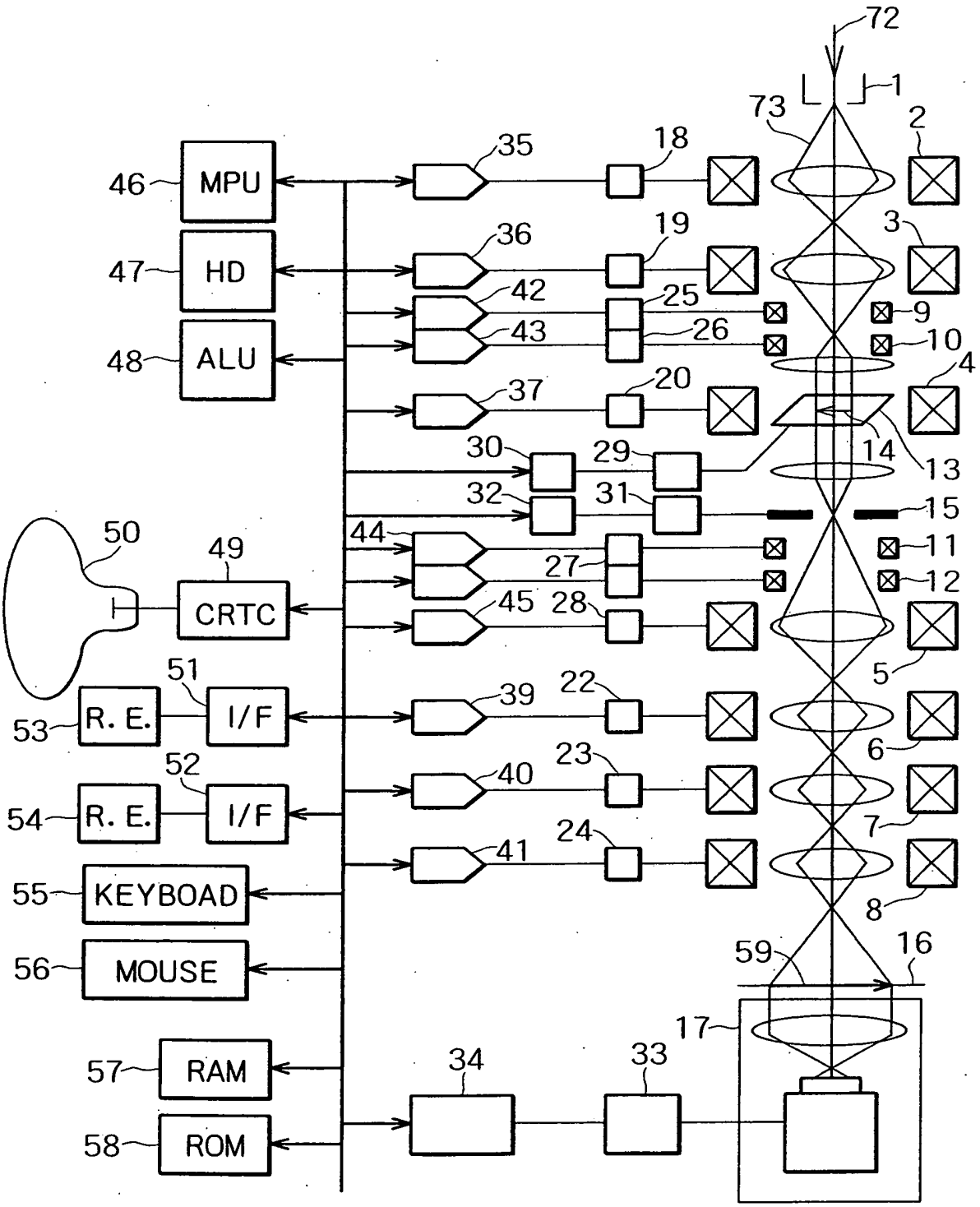

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FIG. 2

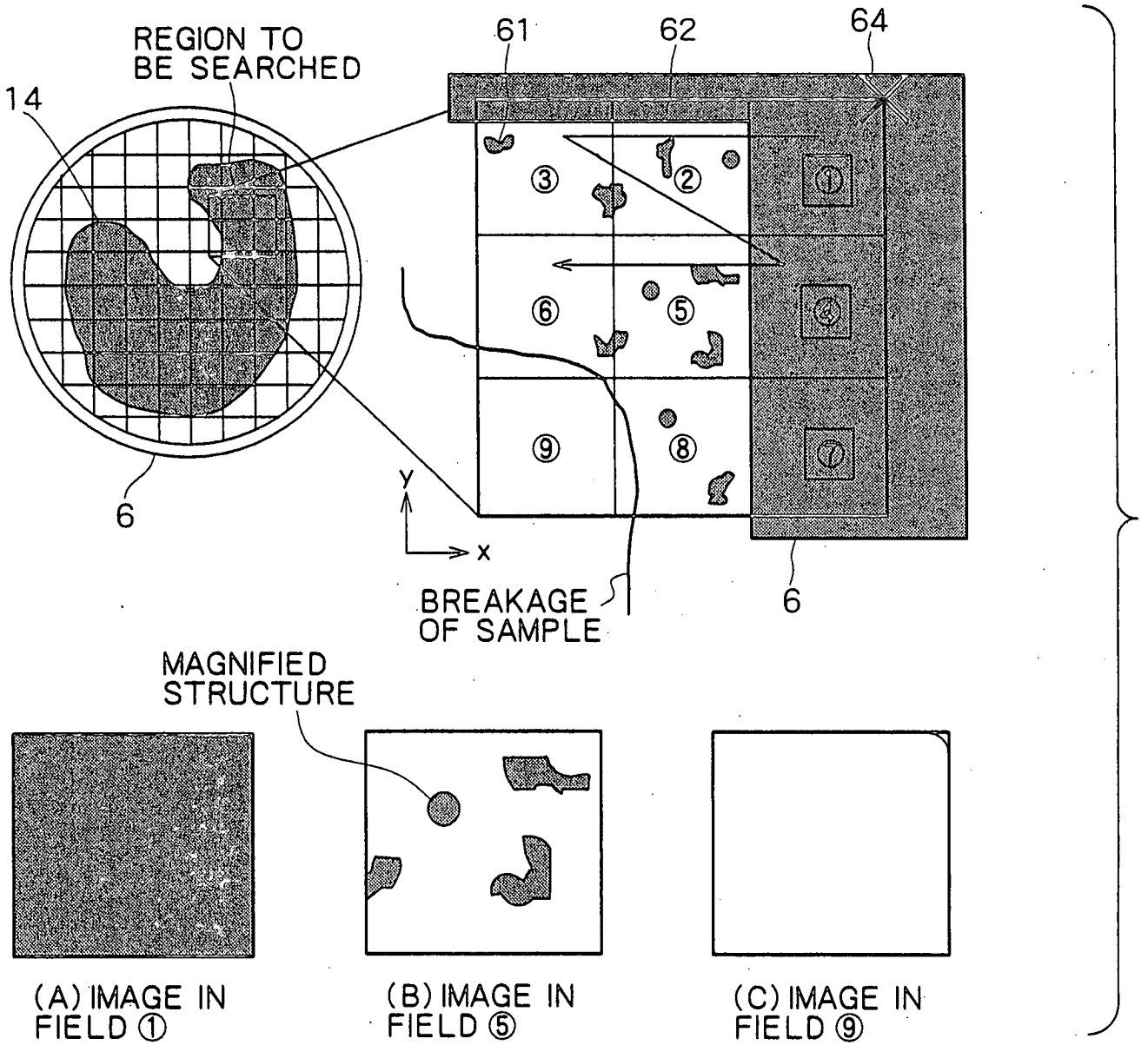
REGION TO BE SEARCHED
14
6
61
62
64
③
②
①
⑥
⑤
④
⑨
⑧
⑦
y
x
BREAKAGE OF SAMPLE
6
MAGNIFIED STRUCTURE
(A) IMAGE IN FIELD ①
(B) IMAGE IN FIELD ⑤
(C) IMAGE IN FIELD ⑨

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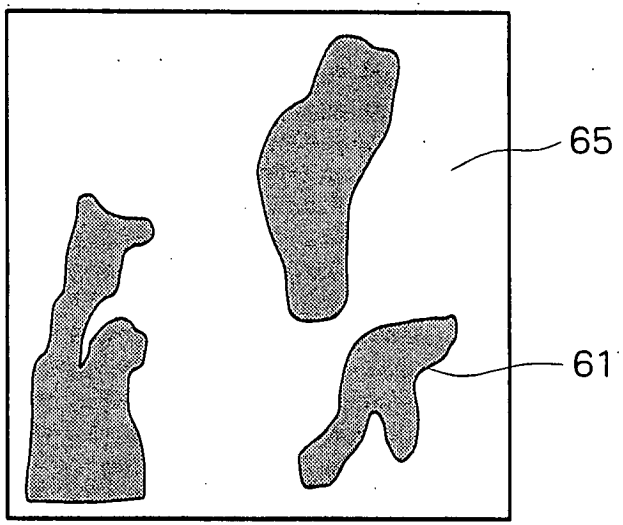
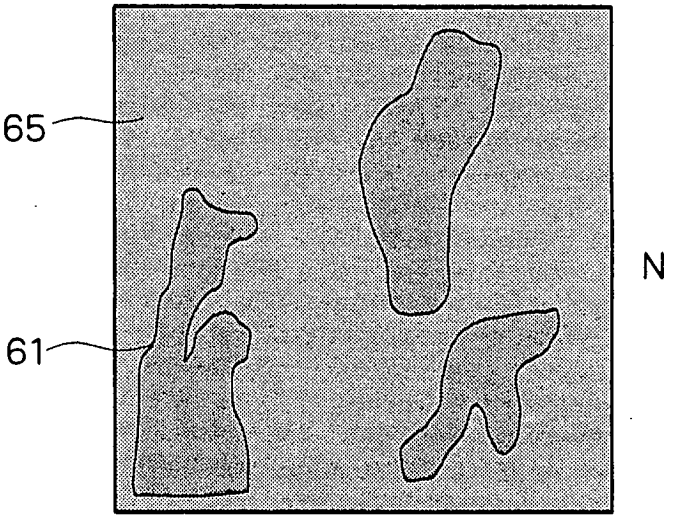
FIG. 3A



EXAMPLE OF MAGNIFIED SAMPLE TRANSMISSION IMAGE

FIG. 3B



EXAMPLE OF MAGNIFIED SAMPLE TRANSMISSION IMAGE (LOW CONTRAST)

FIG. 4

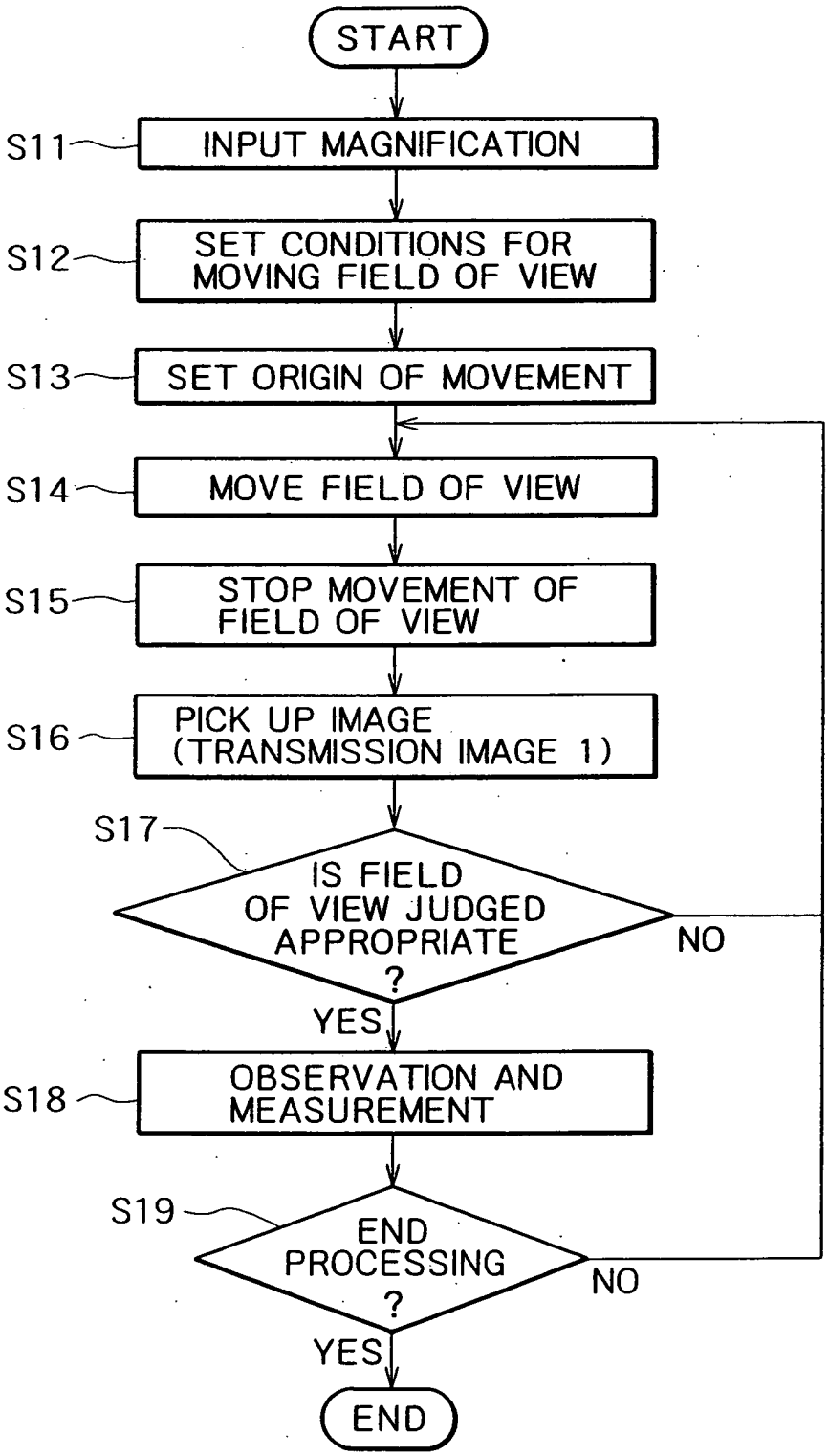
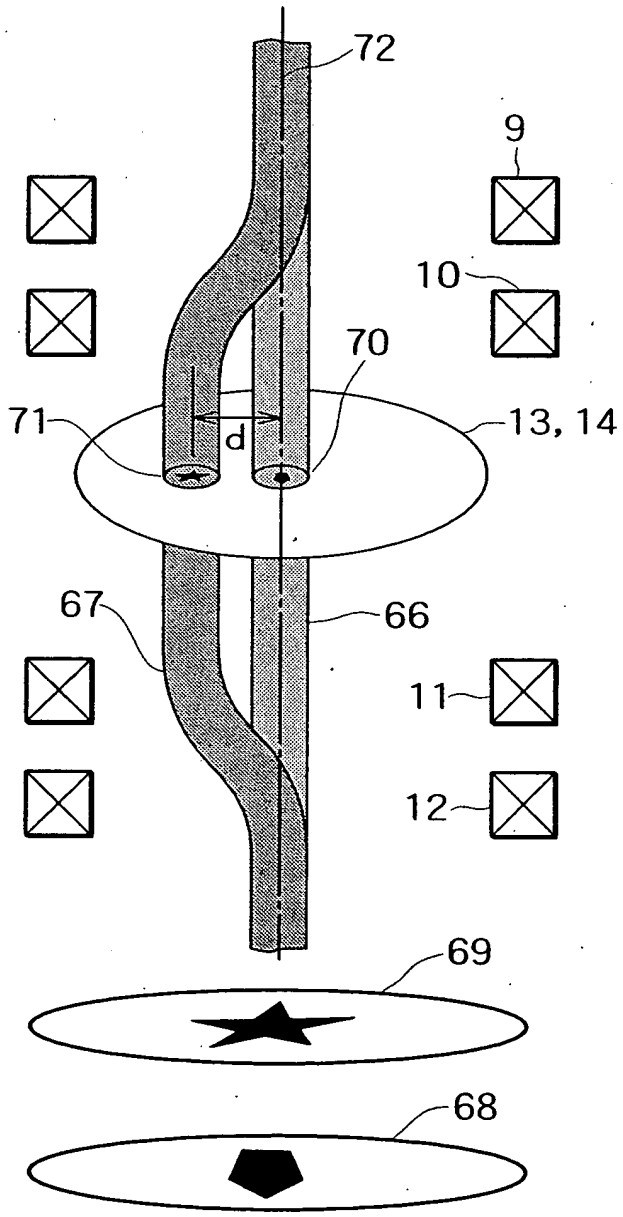
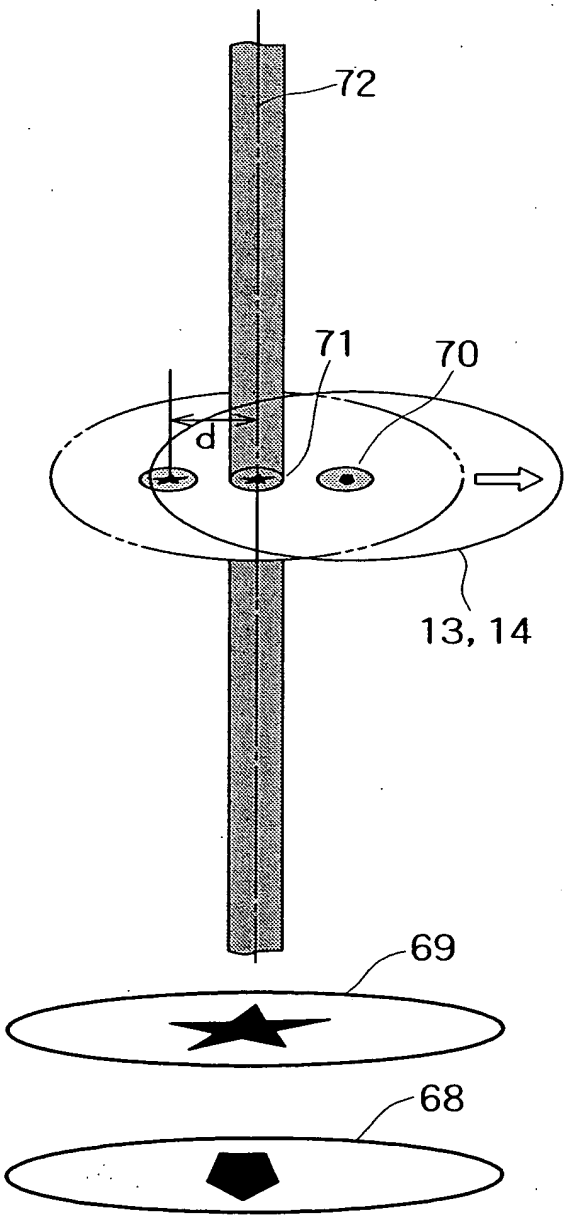

START
S11
INPUT MAGNIFICATION
S12
SET CONDITIONS FOR MOVING FIELD OF VIEW
S13
SET ORIGIN OF MOVEMENT
S14
MOVE FIELD OF VIEW
S15
STOP MOVEMENT OF FIELD OF VIEW
S16
PICK UP IMAGE (TRANSMISSION IMAGE 1)
S17
IS FIELD OF VIEW JUDGED APPROPRIATE ?
NO
YES
S18
OBSERVATION AND MEASUREMENT
S19
END PROCESSING ?
NO
YES
END

FIG. 5A



ELECTROMAGNETIC MOVEMENT OF FIELD OF VIEW USING ELECTRON BEAM DEFLECTING COIL

FIG. 5B



MECHANICAL MOVEMENT OF FIELD OF VIEW USING SAMPLE STAGE DRIVER

EP 0 890 652 A2

TOKUGAN-2002-276250

FIG. 6A

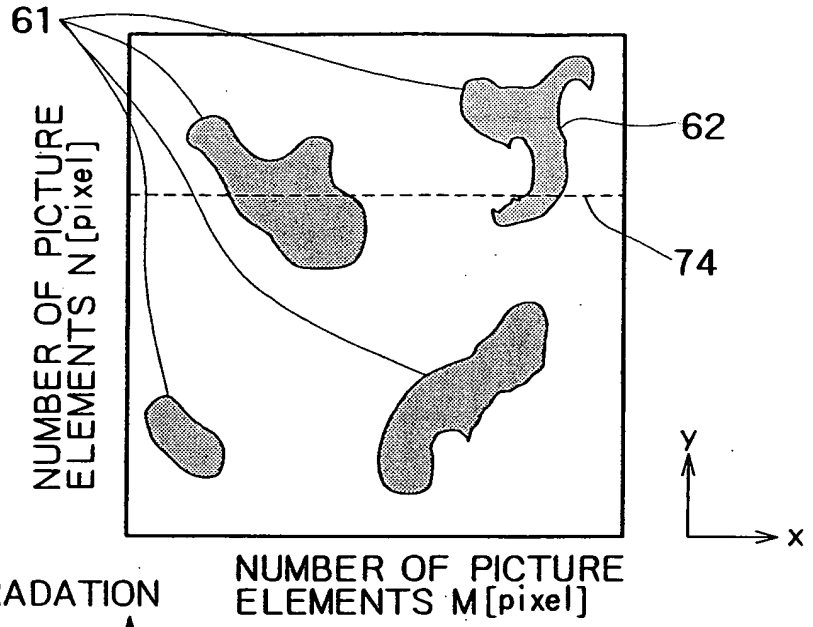


FIG. 6B

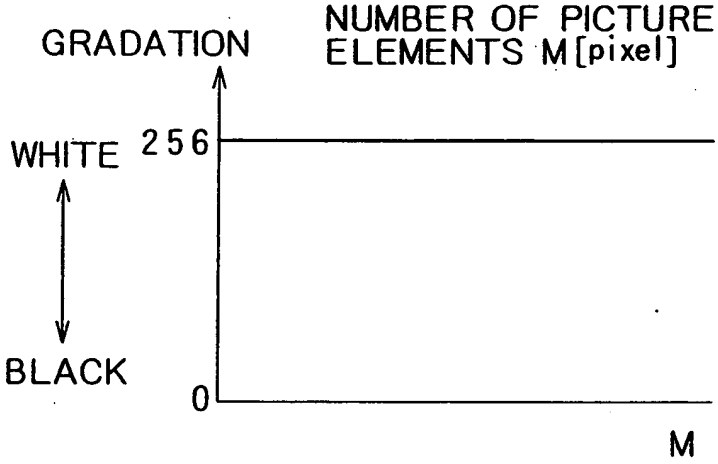


FIG. 6C

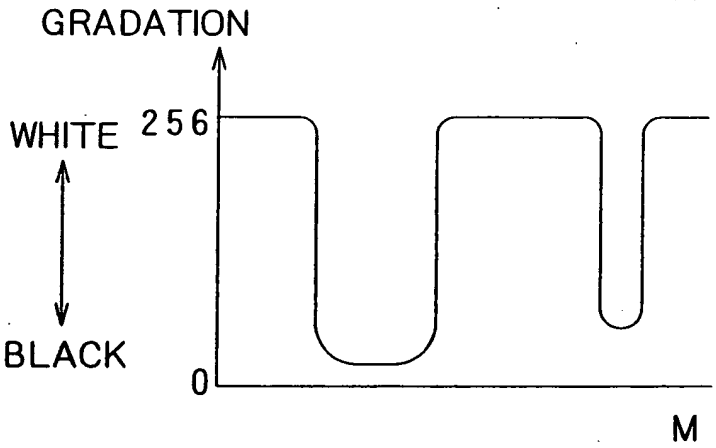


FIG. 6D

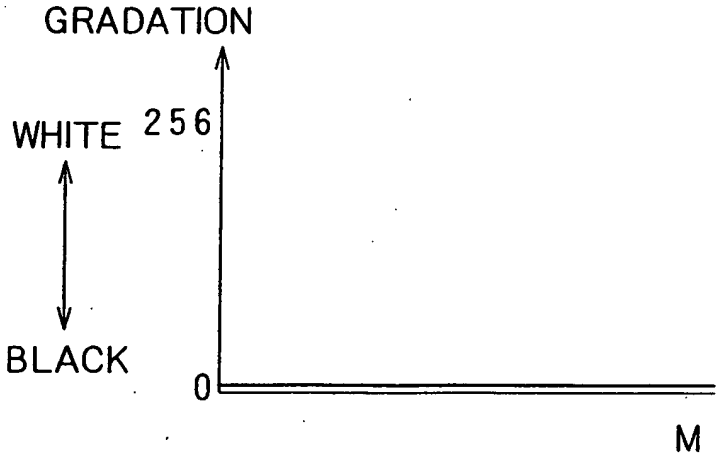


FIG. 7

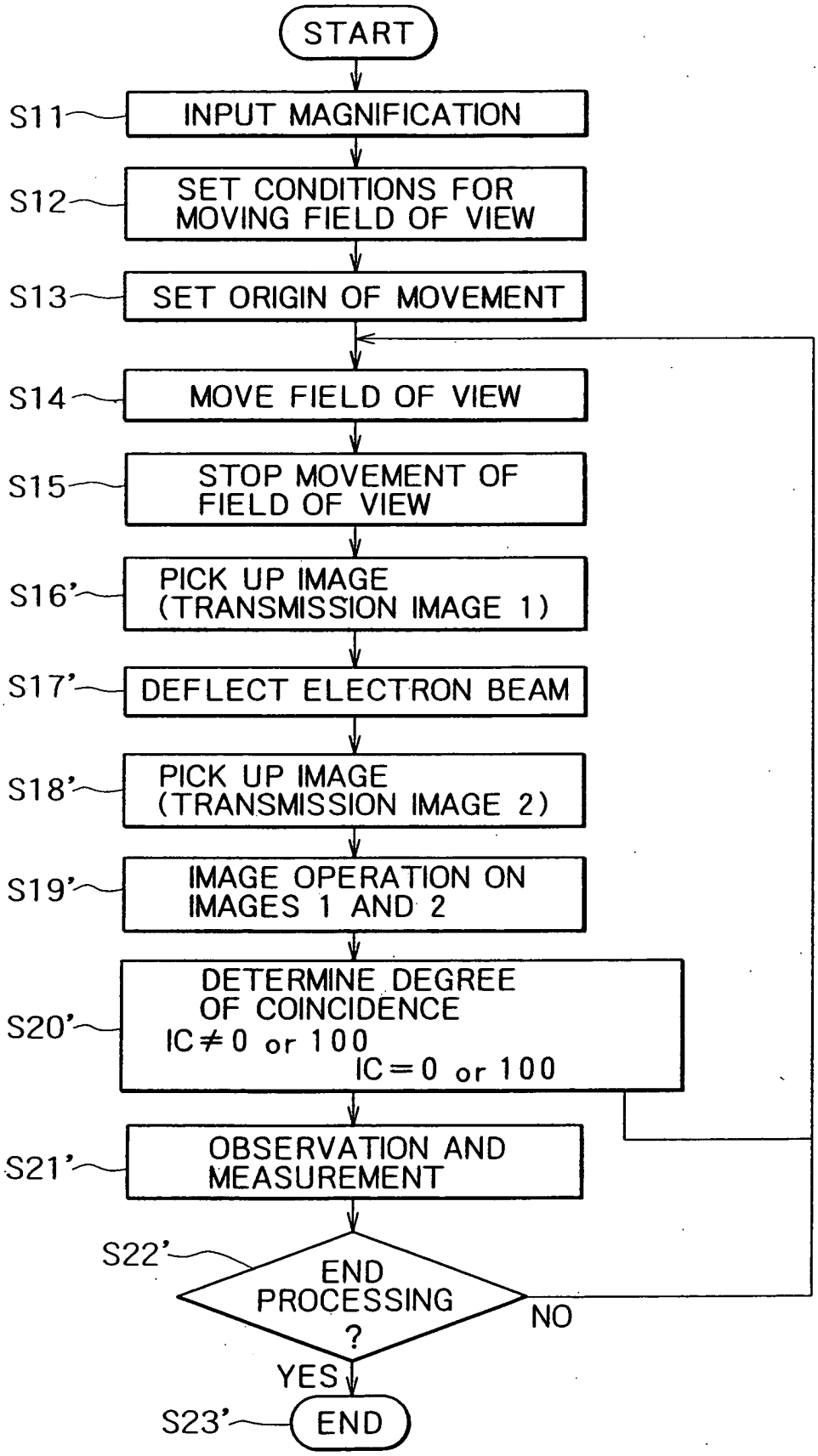

START
S11
INPUT MAGNIFICATION
S12
SET CONDITIONS FOR MOVING FIELD OF VIEW
S13
SET ORIGIN OF MOVEMENT
S14
MOVE FIELD OF VIEW
S15
STOP MOVEMENT OF FIELD OF VIEW
S16'
PICK UP IMAGE (TRANSMISSION IMAGE 1)
S17'
DEFLECT ELECTRON BEAM
S18'
PICK UP IMAGE (TRANSMISSION IMAGE 2)
S19'
IMAGE OPERATION ON IMAGES 1 AND 2
S20'
DETERMINE DEGREE OF COINCIDENCE
IC≠0 or 100
IC=0 or 100
S21'
OBSERVATION AND MEASUREMENT
S22'
END PROCESSING ?
NO
YES
S23'
END

FIG. 8

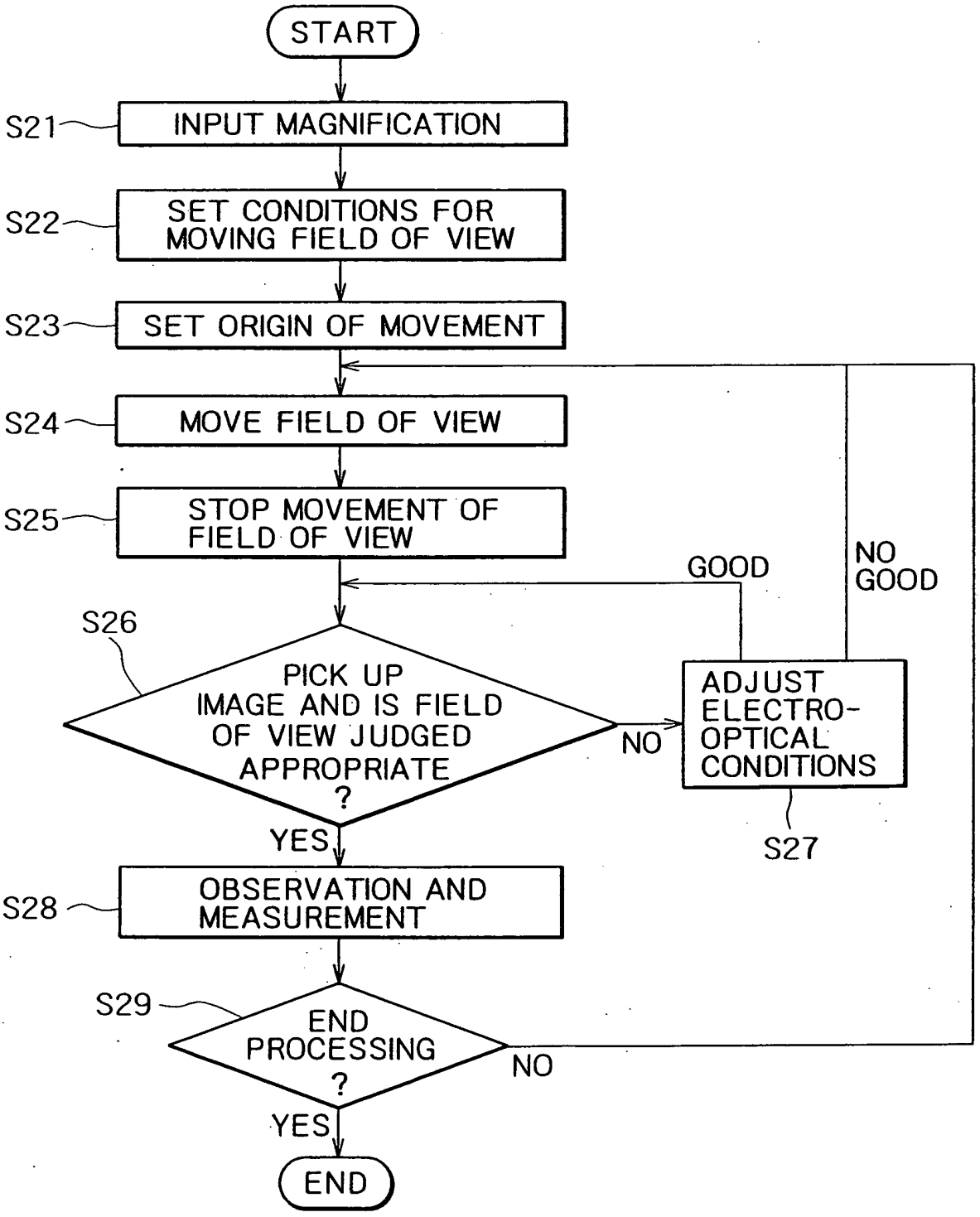

START
S21
INPUT MAGNIFICATION
S22
SET CONDITIONS FOR MOVING FIELD OF VIEW
S23
SET ORIGIN OF MOVEMENT
S24
MOVE FIELD OF VIEW
S25
STOP MOVEMENT OF FIELD OF VIEW
S26
PICK UP IMAGE AND IS FIELD OF VIEW JUDGED APPROPRIATE ?
NO
GOOD
NO GOOD
ADJUST ELECTRO-OPTICAL CONDITIONS
S27
YES
S28
OBSERVATION AND MEASUREMENT
S29
END PROCESSING ?
NO
YES
END

FIG. 9

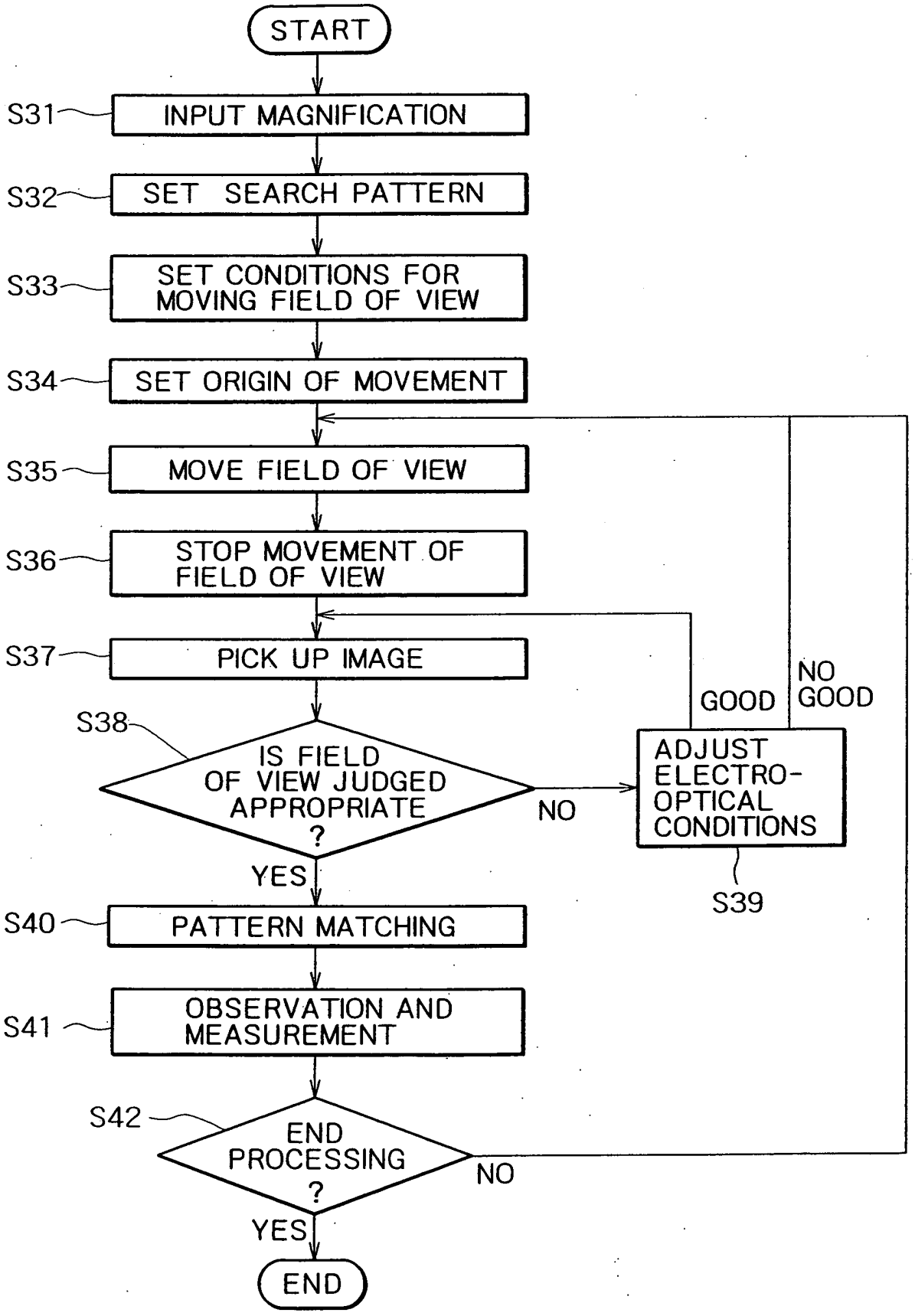

START
S31
INPUT MAGNIFICATION
S32
SET SEARCH PATTERN
S33
SET CONDITIONS FOR MOVING FIELD OF VIEW
S34
SET ORIGIN OF MOVEMENT
S35
MOVE FIELD OF VIEW
S36
STOP MOVEMENT OF FIELD OF VIEW
S37
PICK UP IMAGE
S38
IS FIELD OF VIEW JUDGED APPROPRIATE ?
NO
GOOD
NO GOOD
ADJUST ELECTRO-OPTICAL CONDITIONS
S39
YES
S40
PATTERN MATCHING
S41
OBSERVATION AND MEASUREMENT
S42
END PROCESSING ?
NO
YES
END

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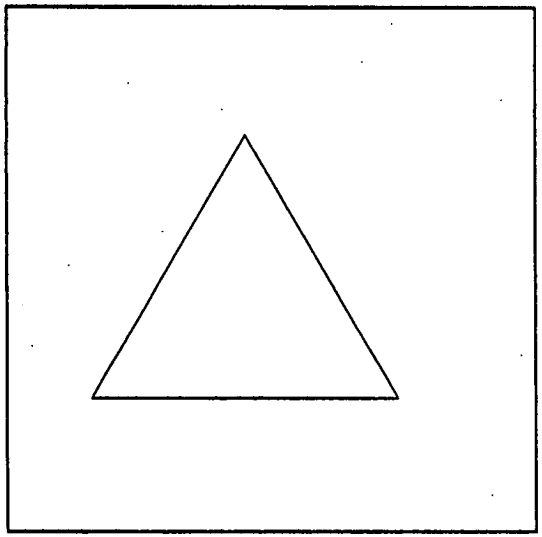
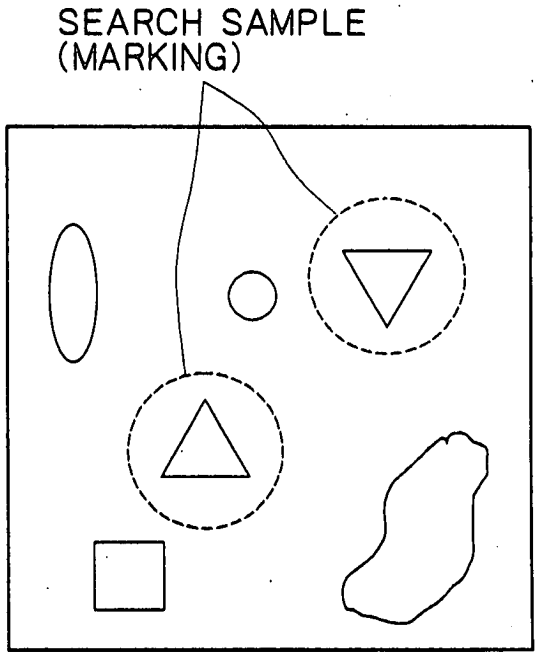
FIG. 10A



SEARCH TARGET PATTERN

FIG. 10B



PICKED-UP FIELD OF VIEW

NUMBER OF SEARCH SAMPLES=2

FIG. 11

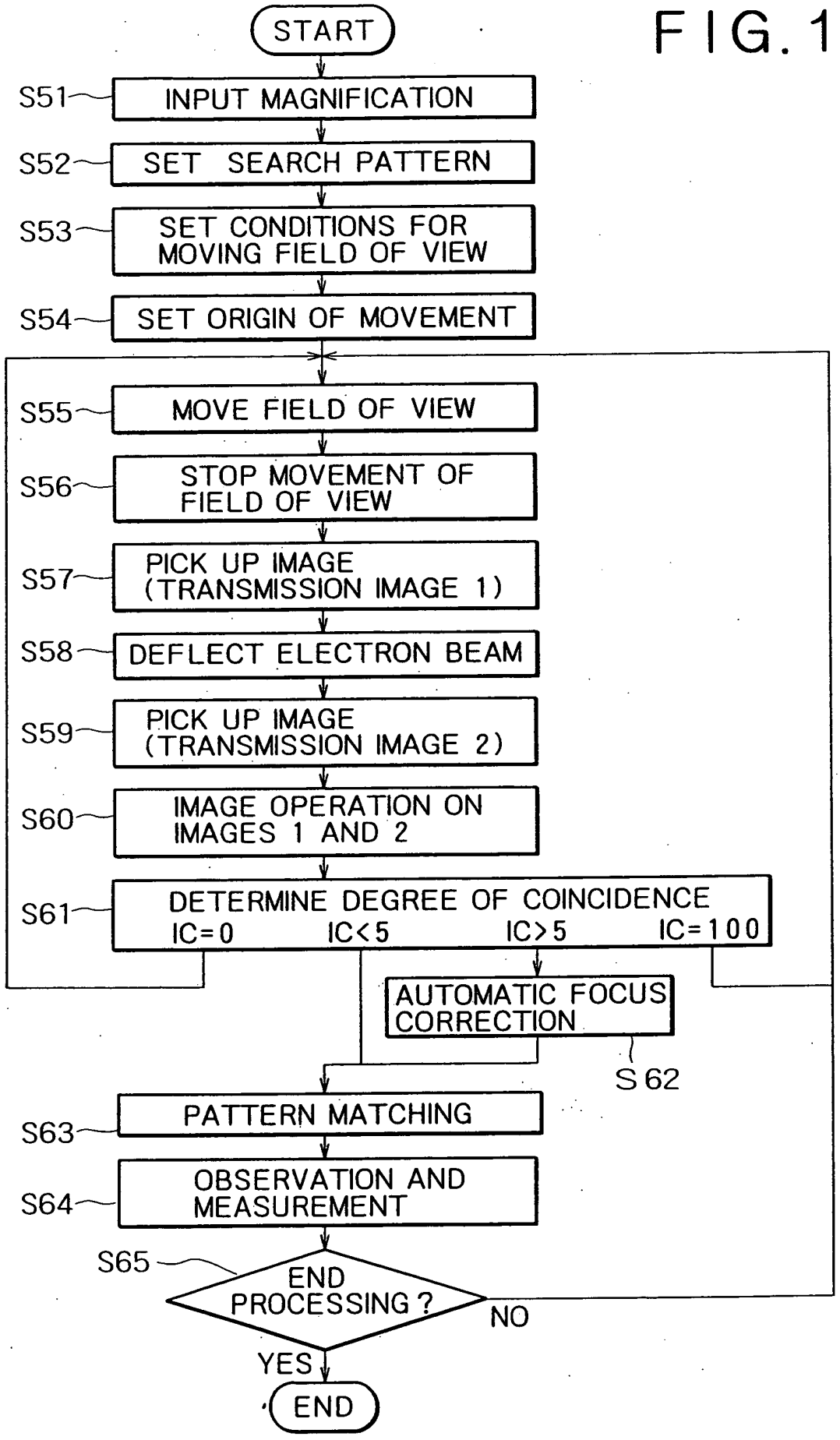

START
S51
INPUT MAGNIFICATION
S52
SET SEARCH PATTERN
S53
SET CONDITIONS FOR MOVING FIELD OF VIEW
S54
SET ORIGIN OF MOVEMENT
S55
MOVE FIELD OF VIEW
S56
STOP MOVEMENT OF FIELD OF VIEW
S57
PICK UP IMAGE (TRANSMISSION IMAGE 1)
S58
DEFLECT ELECTRON BEAM
S59
PICK UP IMAGE (TRANSMISSION IMAGE 2)
S60
IMAGE OPERATION ON IMAGES 1 AND 2
S61
DETERMINE DEGREE OF COINCIDENCE
IC=0
IC<5
IC>5
IC=100
AUTOMATIC FOCUS CORRECTION
S62
S63
PATTERN MATCHING
S64
OBSERVATION AND MEASUREMENT
S65
END PROCESSING ?
NO
YES
END

FIG. 12

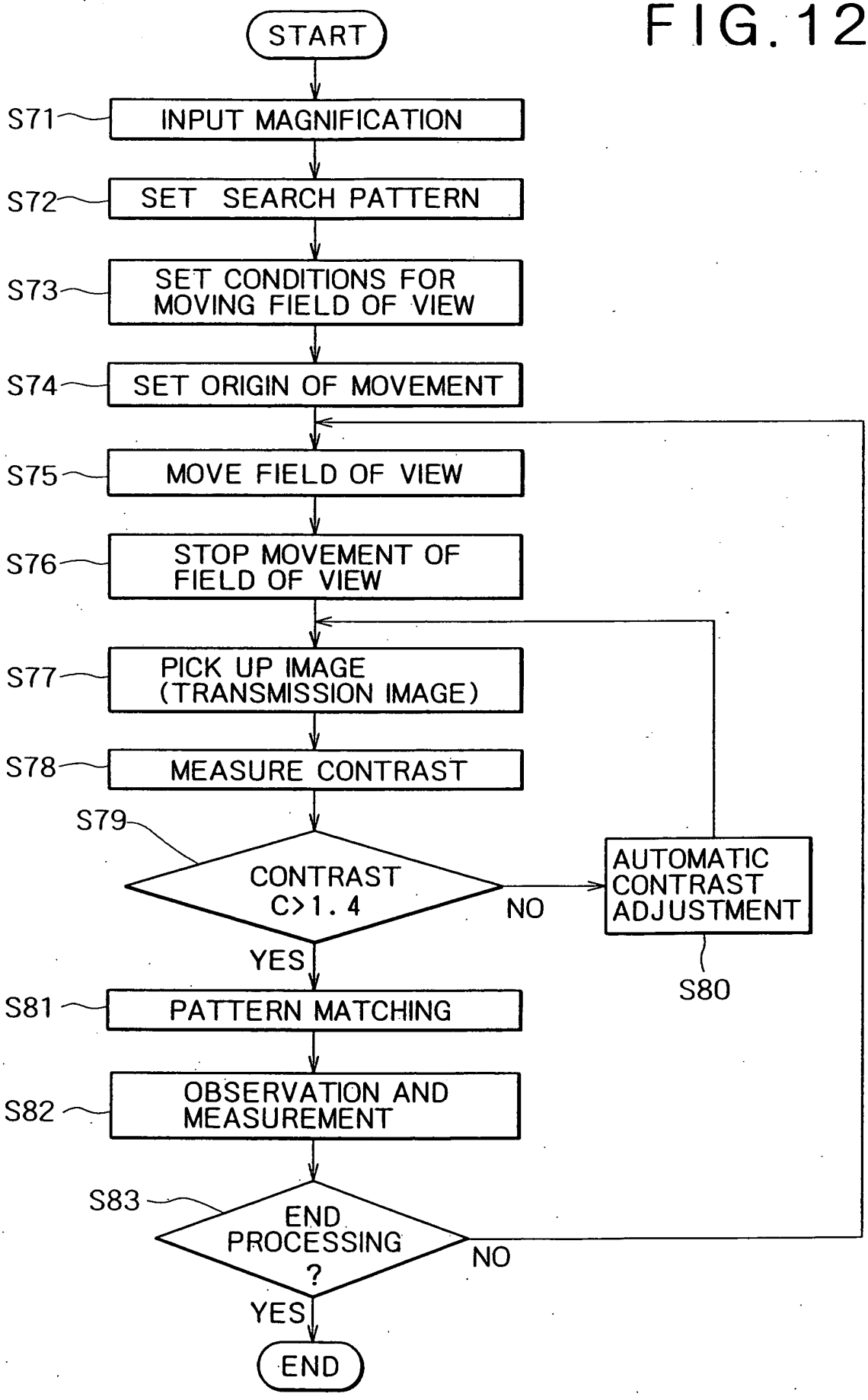
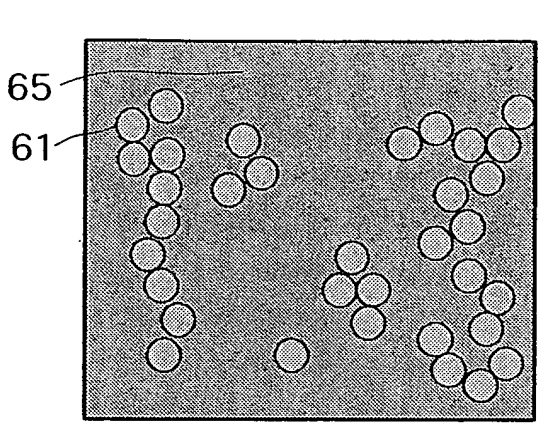

START
S71
INPUT MAGNIFICATION
S72
SET SEARCH PATTERN
S73
SET CONDITIONS FOR MOVING FIELD OF VIEW
S74
SET ORIGIN OF MOVEMENT
S75
MOVE FIELD OF VIEW
S76
STOP MOVEMENT OF FIELD OF VIEW
S77
PICK UP IMAGE (TRANSMISSION IMAGE)
S78
MEASURE CONTRAST
S79
CONTRAST C>1.4
NO
AUTOMATIC CONTRAST ADJUSTMENT
S80
YES
S81
PATTERN MATCHING
S82
OBSERVATION AND MEASUREMENT
S83
END PROCESSING ?
NO
YES
END

FIG. 13 (1)



CONTRAST C=1.1

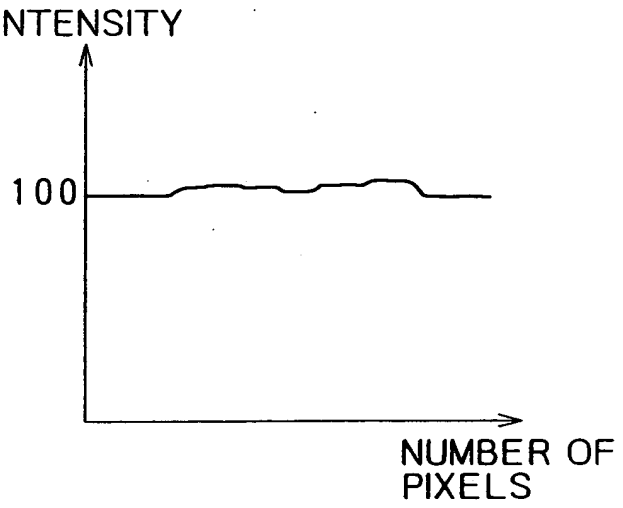
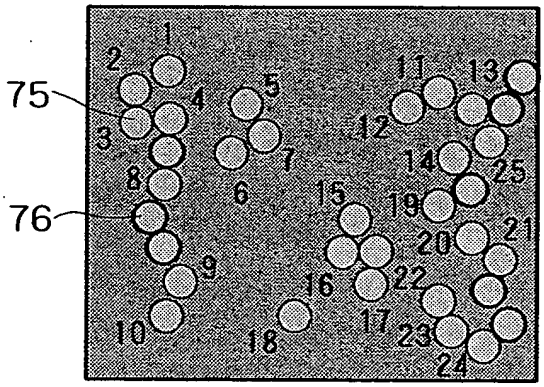


FIG. 13 (2)



CONTRAST C=1.2

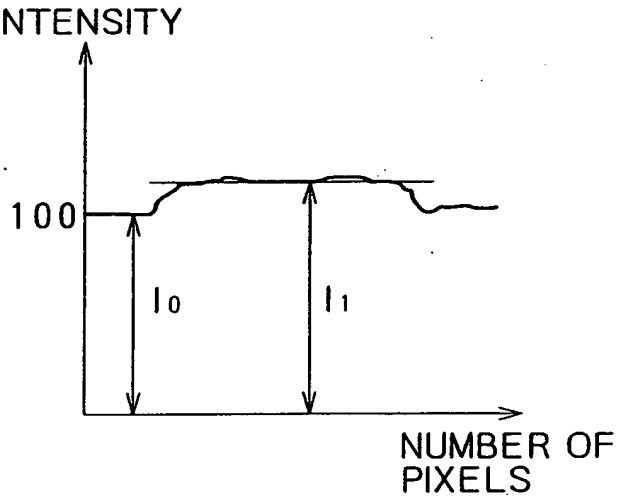
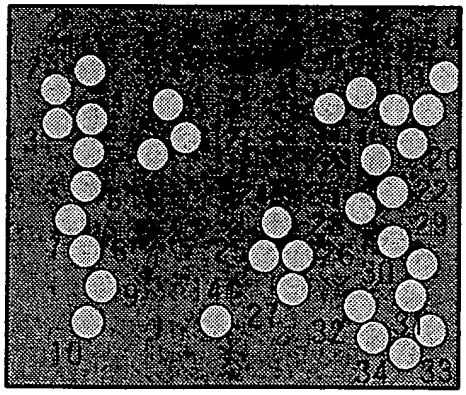


FIG. 13 (3)



CONTRAST C=1.6

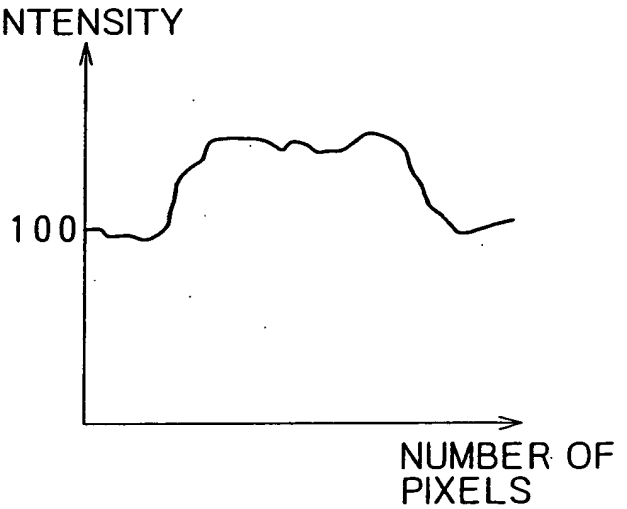


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FIG. 14

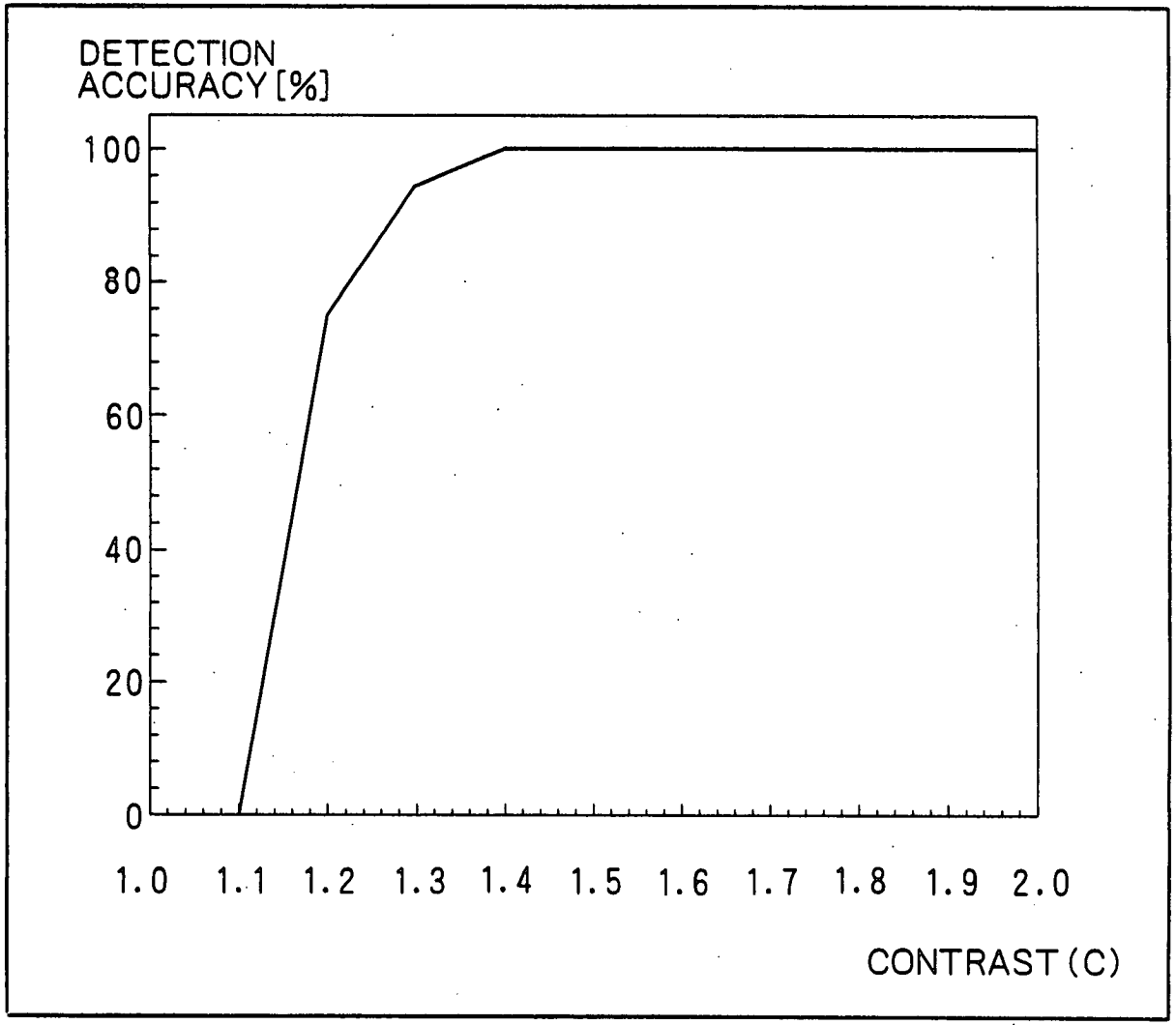

DETECTION
ACCURACY [%]
100
80
60
40
20
0
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2.0
CONTRAST (C)

FIG. 15

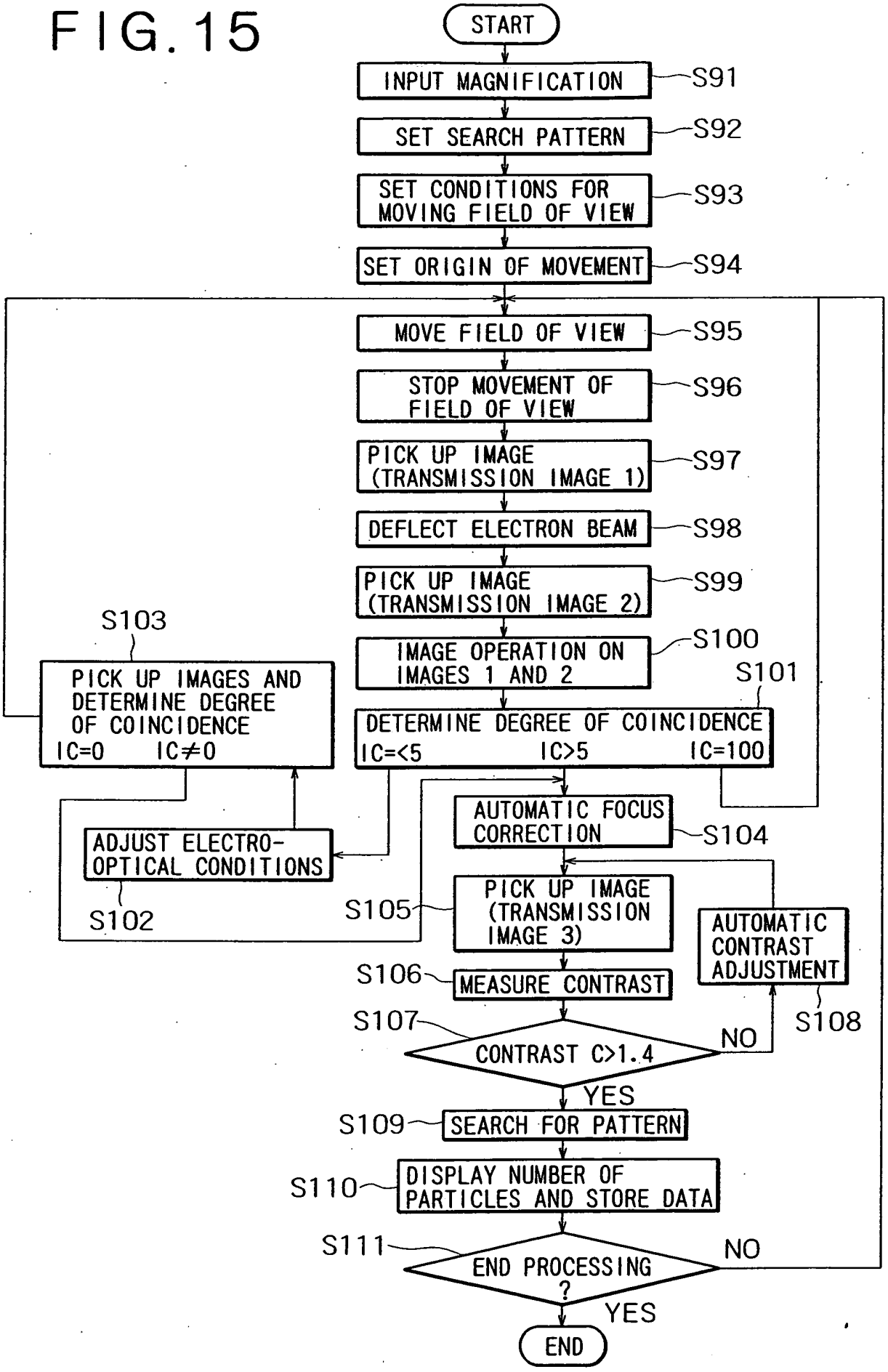
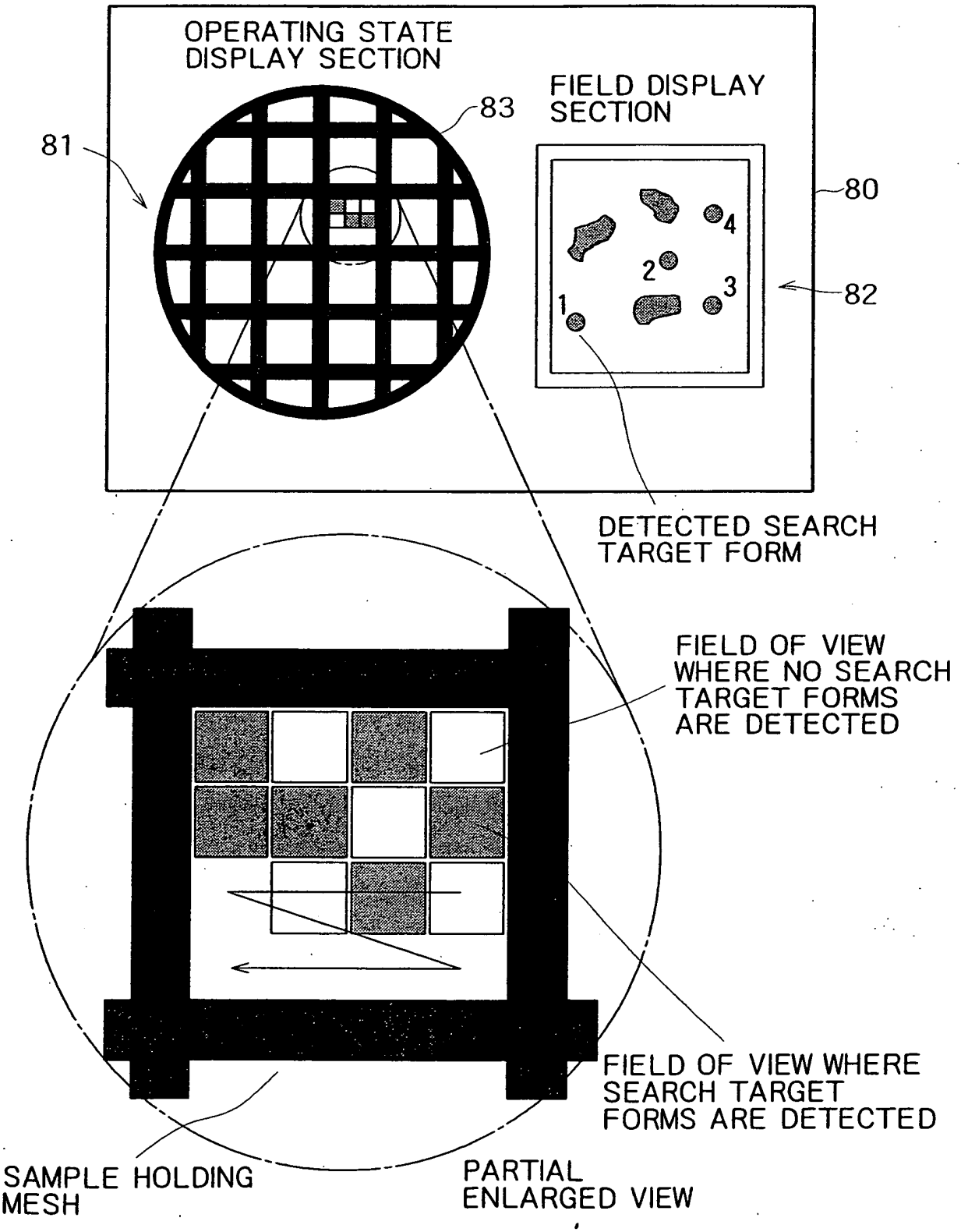

START
INPUT MAGNIFICATION
S91
SET SEARCH PATTERN
S92
SET CONDITIONS FOR MOVING FIELD OF VIEW
S93
SET ORIGIN OF MOVEMENT
S94
MOVE FIELD OF VIEW
S95
STOP MOVEMENT OF FIELD OF VIEW
S96
PICK UP IMAGE (TRANSMISSION IMAGE 1)
S97
DEFLECT ELECTRON BEAM
S98
PICK UP IMAGE (TRANSMISSION IMAGE 2)
S99
IMAGE OPERATION ON IMAGES 1 AND 2
S100
DETERMINE DEGREE OF COINCIDENCE
IC=<5
IC>5
IC=100
S101
PICK UP IMAGES AND DETERMINE DEGREE OF COINCIDENCE
IC=0
IC≠0
S103
ADJUST ELECTRO-OPTICAL CONDITIONS
S102
AUTOMATIC FOCUS CORRECTION
S104
PICK UP IMAGE (TRANSMISSION IMAGE 3)
S105
MEASURE CONTRAST
S106
CONTRAST C>1.4
S107
NO
AUTOMATIC CONTRAST ADJUSTMENT
S108
YES
SEARCH FOR PATTERN
S109
DISPLAY NUMBER OF PARTICLES AND STORE DATA
S110
END PROCESSING ?
S111
NO
YES
END

FIG. 16


OPERATING STATE DISPLAY SECTION
FIELD DISPLAY SECTION
81
83
80
82
1
2
3
4
DETECTED SEARCH TARGET FORM
FIELD OF VIEW WHERE NO SEARCH TARGET FORMS ARE DETECTED
FIELD OF VIEW WHERE SEARCH TARGET FORMS ARE DETECTED
SAMPLE HOLDING MESH
PARTIAL ENLARGED VIEW